LIC AUDIO

XL-500R

GENERAL DESCRIPTION
(vers. o6)

XL-500R INDUCTION LOOP AMPLIFIER

General description

The XL-500R is azzn induction loop amplifier, which is designed to enable hearing aid users to clearer and better hearing in any area where the induction loop is installed. It is equipped with three electronically balanced XLR-inputs, and is designed for 19" rack mounting. All controls are accessible from the front panel, with inputs and outputs at the rear.

Why is an induction loop needed?

In a noisy environment, or one in which reverberations and echoes are noticeable, we all find it difficult at times to hear and understand what is said. But for a person with impaired hearing it is usually impossible to hear and understand under such conditions, even with the help of a hearing aid. It is in such environments that the XL-500R is intended to operate.

In such an application the XL-500R - which accepts microphone, line and loudspeaker levels - amplifies this alternating signal and feeds it into induction loop, thus producing an equivalent alternating magnetic field in the area covered by the induction loop wire. The magnetic field can then be reconverted to sound by the induction coil of a listener´s hearing aid. This provide the hearing aid user with clear, undistorted reception of the programme being transmitted over a loudspeaker system.

The advantage to the hearing aid user is that he avoids all the interference and distortion that occur when listening to airborne sound - including difficulties such as the distance from the loudspeakers, reverberations, th eterference of the sound made by the audience, and so on. Instead , the hearing aid user recieves the sound clearly, and at the volume to suit him perfectly.

Avoid make shift solutions

Too often, when the needs of the hearing aid users have been recogniced in a theatre, a church, or some similar place, an unsuitable amplifier system has been chosen. In many such cases, due to ignorance or indifference, normal audio amplifiers have been used to feed induction loops, ussually with very poor results. This mistake can easily be avoided by employingg amplifiers which are designed solely for induction loop operation.

Purpose -designed Xl-500R

The XL-500R amplifier system is designed specifically for the purpose of feeding an induction loop, to enable hearing aid users to enjoy the benefits of inductive listening. The engineering design is the best possible for the purpose. It has been developed as a result of extensive experience, by LIC AUDIO, the world´s largest supplier of hearing aids, induction loop systems and supplementary aids for the hard of hearing.

Can easily be operated from your existing loudspeaker system

LIC AUDIO representatives can readily arrange an installation of XL-500R that is adapted not only to your existing loudspeaker system but also to the particular conditions existing in your theatre, church or similar meeting places.

Inputs and Outputs, designed to suit any application

The XL-500R is designed with three electronically balanced inputs, all with different characters and equipped with XLR connectors (on rear panel).
• **LINE 1**, with switchable AGC function, indicated by a LED. (High sensitivity LINE input, gain control on the front panel).
• **LINE 2**, without AGC function. (Low sensitivity LINE input, gain control on front panel).
• **MIC**, with 48V phantom power supply (specially designed to relay ambient sound, gain control on the front panel).
• **BASS** and **TREBLE,** 2- band equalizer for maximum performance and speech intelligibility. (Controls on front panel).

The output stage is designed for use with a 2-turn loop. The output connector is a "Spring Clip Terminal block", which means that it´s very easy to connect the loop wire to the amplifier.

Automatic "Stand-by" switching

The XL-500R can be left permanentely connected to the electrical supply mains and to the sound source (usually a loudspeaker system). It can then operate unattended, as it automatically switches on when an input sound signal reaches a preset level. It automatically switches off again if no input signsl is received during a period of 5 minutes (indicated by a LED). This means that it´s always ready when needed, without wasting electric current when on "stand-by".

Automatic Gain Control (AGC) over a very broad range

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Automatic Gain Control ("AGC") over a very broad range

The XL-500R is designed with an switchable "AGC-function". AGC is designed to provide the listener with a steady level volume of sound, irrespective of variations in sound volume at the actual sound source. Very wide variations can occur when an orchestra goes from a soft passage into an suddenly loud passage, perhaps with strong percussion instruments. Similarly,

large variations of this type can occur when singers or speakers move suddenly close to a microphone. The AGC regulation is intended to smooth out these large variations so that the overloading of the hearing aid does not occur, and distortion is thus avoided. The AGC regulation of the XL-500R covers a very wide range, more than 70dB, and thus it copes adequately with any sudden increases in the input signal.

A built-in limiter makes even loud speech clear

Also a limiter is incorporated in the output-circuit to the loop to avoid peak clipping. It also makes it possible to raise the average level (the dynamic range is strictly controlled, without distortion added). This ensures that even the loop-current is at a high level, there will be maximum comprehensibility of voices transmitted over the loop.

Easy to check that the system is working

It is easy for the caretaker or any other responsible person to make sure that the loop system is working and that the magnetic field has been built up. This is provided by a bank of 4 LED's on the front panel - which even gives a visual indication of loop current output, from 2 to 15 amps!

Complies with national and international standards

The XL-500R is capable of providing, over a whole area served by the loop, field strengths recommended by the *International Electrotechnical Commission*, Geneva, and equivalent national standards, such as the appropriate *British Standard*.
this also applies to the frequency response, which varies by not more than ± 3dB over the frequency range of 100 to 5000 Hz.

Technical specification:

Power supply:	220 - 240 VAC
Area of coverage:	500 m^2 (5500 sq. ft)
Max. output current:	15A RMS (below 125 ms with a 1 Ω load)
Frequency range:	100 - 5500 Hz
Distortion:	1% (1 Ω load, 1kHz)
AGC regulation range:	>70 dB
Inputs:	
LINE 1:	15 mV - 10 V / 80 kΩ (S / N -68dB)
LINE 2:	150 mV - 5,5 V / 80 kΩ (S / N -68dB)
MIC:	0,8 mV - 30 mV / 4,5 kΩ (S / N -65dB)
Equalizor:	
BASS:	±9 dB, 500Hz
TREBLE:	±9 dB, 1,2kHz

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Appendix 1:1

To achive an 80% to 90% coverage, the "relative listening height" (Z) should be about 0,2. To illustrate this, assume that the loop is to be installed in a room measuring 20 x 25 m = 500m^2 (A). It is required that at least 80% of this area should be an acceptable listening area. When the loop is installed at the floor level, the listening height (X) is about 1,2m.

The distance between the listening height and the floor level will therefore be given by the formula:

$$X = \frac{Z \times \sqrt{A}}{2} = \frac{0{,}2 \times \sqrt{500}}{2} = 2{,}25m$$

In other words, the loop should be installed 3.45m (1,2 + 2,25) above the floor to give the maximum area of coverage.

Appendix 1:2

To determine the dimension of the loop wire

Depending on the results of field measurments and the listening results, choose either a 1-turn loop ar a 2-turn loop. *Note: A 2-turn loop is recommended as best matching the amplifier's output stage.*

For areas between 150 and 250m^2 – use 2 x 0,75mm^2 wire
For areas between 250 and 350m^2 – use 2 x 1,50mm^2 wire
For areas between 350 and 500m^2 – use 2 x 2,50mm^2 wire

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XL-500R

INSTALLATION INSTRUCTIONS

(vers. 06)

XL-500R INDUCTION LOOP AMPLIFIER

The XL-500R is an improved version of the popular XL-500. To meet the demand of both customers and installation engineers, the XL-500R is designed to fit a standard 19“ rack mounting.
The XL-500R features three – all electronically balanced and with different characters – input accessible via XLR-connectors from the outside of the unit – LINE 1, LINE 2 and MIC.
The XL-500R is a loop amplifier that complements an audio system.

Basic characteristics

- Designed for 220-240V mains operation.
- Fitted with device output and mains switch.
- Automatic “stand by“ function (indicated by LED), if no input signal is received for 5 minutes.
- Three input fitted with XLR connectors:
  LINE 1 – High sensitive Line input, with a switchable AGC function, shown by a LED indicator.
  LINE 2 – Low sensitive Line input, without AGC function.
  MIC – Specially designed for “room“ or “general purpose“ pressure zone type microphones used at long range, without AGC function.
- 2 - Band equalizor BASS and TREBLE.
- A bank of 4 LED indicators, to visual show the output current and the loop operation.

INSTALLATION INSTRUCTIONS

Before you begin the installation

- Make sure that a grounded mains socket, rated for 220V (240V) is available

- Check to ensure that the background magnetic interference is acceptable in the area to be served by the loop. (It should be less than –25dB(A), re 100 mA / m)

- Plan the layout of conductors in such way that the leads carrying the input signals are **not** placed in parallel and / or close to the loop conductors.

- If the area to be covered is less than 200 m^2 (about 2000 sq ft), take into consideration that the loopwire should be run either at floor level, or about 2,5 meters above floor level. For other areas of coverage, see Appendix 1:1. Chose the alternative that is best suited for the location you intend to cover.
- Choose loop wire of the correct dimension, in relation to the area to be covered. See appendix 1:2.

Connecting up

- Connect the loop wire to the **LOOP** connector (on the rear).

For a 1-turn loop, use the red sockets.
For a 2-turn loop, use the black sockets as the intermediate connection point.

- Connect the program source to the appropriate input socket, **LINE 1** or **LINE 2**.

WARNING: ***Before connecting the XL-500R to the mains, make sure that the*** *OUTPUT LEVEL* ***potentiometer (on the front) is set to "MIN" position.***

Adjusting the input level

1. With AGC (*LINE1)*

In most cases the best arrangement is to turn the AGC switch to the "on" (right) position, and the LINE1 potentiometer so that the AGC-LED activates even at very small signals. The AGC regulation range is very broad, >79dB, and therefore a correct level is maintained on the loop, irrespective of change in the sound volume at the sound source.

Note: For better dynamic range when using the AGC, adjust the line1 potentiometer so that the AGC-led lights only in normal "program peaks".

2. Without AGC(LINE1 or LINE2)

In certain cases it can be desirable to control the input level manually. A typical case is when the sound programme via microphones places heavy demands on the sound system and the artistic quality of the sound must still be maintained. In this regard, note that a hearing aid user often has difficulty in experiencing fully the effects of a broad dynamic range.

Adjusting the loop current

Adjust the loop current with the OUTPUT LEVEL potentiometer (on front panel) until the recommended field strength is obtained. The field strength measurements should be made with an appropriate field strength meter of the *Adelta MFM* type, or similar, Note that the recommended field strength is based on the *International Commission´s* publication, *IEC-118-4,* which has been accepted and incorporated in most national standards. The standard is 100 mA / m (RMS) in the frequency range of 100 to 5 000 Hertz.
If necessary adjust BASS and / or TREBLE to achive a higher listening comfort.

How to connect a general purpose microphone.

The MIC input on XL-500R is specially designed to relay ambient sound, for example: a choir singer or general ambient sounds. Therefore:

-Place the microphone in the room, at a long range distance from the sound source.
-Adjust the sensitivity, using the potentiometer marked MIC until the the sound heard via the loop gives a good acustic "colour" to the sound.

Technical specification

Power supply: 220 – 240V AC
Area of coverage: 500 m^2 (5500 sq ft)
Max output current: 15A RMS(125mS, with a 1 ohms load)
Frequency range: 100 5500 Hz
Distortion: 1% (1 ohms load, 1000Hz)
AGC regulation range: >70dB
INPUTS:

LINE1: 15mV – 10V / 80Kohm (S / N –68dBA) With switchable AGC function, external sensitivity control.

LINE2: 150mV – 5,5V / 80Kohm (S / N –68dBA) Without AGC function, internal sensitivity control.

MIC: 0,8mV – 30mV / 4,5Kohm (S / N –65dBA) Without AGC function. External sensitivity control. 48V Phantom power, for use with condenser or electret microphone.

Equalizor:
BASS: ±9 dB, 500Hz
TREBLE: ±9 dB, 1,2kHz

(All inputs are electronically balanced.)

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